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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/748,829 | 12/29/2003 | Weidong Yang | NAN066 US | 7169 |
| 34036 7590 07/26/2007 Silicon Valley Patent Group LLP 18805 Cox Avenue Suite 220 Saratoga, CA 95070 | | | EXAMINER ROSARIO, DENNIS | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/748,829

Applicant(s)

YANG ET AL.

Examiner

Dennis Rosario

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 July 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) 1-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 23-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/19/04 6/14/04</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group III, claims 23-36 in the reply filed on 7/3/07 is acknowledged.

Claims 1-22 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Groups I and II, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 7/3/07.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 23,24 and 33 are rejected under 35 U.S.C. 102(e) as being anticipated by Nikoonahad et al. (US Patent 7,009,704 B1).

Regarding claim 23, Nikoonahad discloses a method comprising:

- a) providing an overlay pattern (fig. 9) having a plurality of measurement locations, each measurement location includes a bottom diffraction grating (fig. 9,num. 132) and a top diffracting grating (fig. 9,num. 136) that overlies the bottom diffraction grating and has a designed in offset (or "different pitch" in col. 11, line 67) from the bottom diffraction grating;

- b) illuminating (fig. 1: Illumination) each of the plurality of measurement locations of the overlay pattern with incident radiation that reacts with the diffraction gratings;
- c) detecting (fig. 1,num. 32) the radiation from the measurement locations after reacting with the diffraction gratings;
- d) determining the overlay error (via fig. 8,num. 18) between the bottom diffraction gratings and the top diffraction gratings using the detected radiation from the measurement locations from the overlay pattern; and
- e) correcting the overlay error (or "correct any errors" in col. 16, line 3) for effects of local process variations created during processing of the overlay pattern using the detected radiation from at least one pair of the measurement locations from the overlay pattern.

Regarding claim 33, claim 33 is rejected the same as claim 23 except for the additional limitation as discloses in Nikoonahad of a method comprising:

- a) providing an overlay patten (fig. 6A,num. 34) having at least four measurement locations (one of which is indicted by an arrow pointing to 34 that can points to other areas of 34), each measurement location having a bottom diffraction grating (fig. 6A,num. 24(1)) and a top diffracting grating (fig. 6(A), num. 24(2)) that overlies the bottom diffraction grating and has a designed in offset (as shown in fig. 6A) from the bottom diffraction grating, at least two pairs of the measurement locations have the same magnitude designed in offset (or "same settings for pitch" in col. 11, line 65).

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Regarding claim 24, claim 24 is rejected the same as claim 23 except for the additional limitation as disclosed in Nikoonahad of further comprising:

a) providing the overlay pattern (or “wafer: in col. 15, line 61) having the plurality of measurement locations prior (during a “remov[al] in col. 15, line 63 process) to depositing the top diffraction gratings (or “photoresist” in col. 15, line 60) over the bottom diffraction gratings, such that the overlay pattern is incomplete and each measurement location of the incomplete overlay pattern has a bottom diffraction grating.

4. Claims 33 and 34 are rejected under 35 U.S.C. 102(e) as being anticipated by Raymond (US Patent 6,856,408 B2).

Regarding claim 33, Raymond discloses of a method comprising:

- a) providing an overlay pattern (fig. 1: Film layers) having at least four measurement locations (one of which is indicted by an arrow pointing to Film layers that can points to other areas of Film layers), each measurement location having a bottom diffraction grating (or bottom portion of Film layers) and a top diffraction grating (fig. 1: Patterned (periodic) features) that overlies the bottom diffraction grating and has a designed in offset (fig. 14:offset) from the bottom diffraction grating, at least two pairs (as shown on the right side of fig. 15) of the measurement locations have the same magnitude (fig. 15: offset=-50nm and offset=50nm) designed in offset;
- b) illuminating (fig. 1:Input laser beam) each of the measurement locations of the overlay pattern with incident radiation that reacts with the diffraction gratings;
- c) detecting (fig. 1:Detector) the radiation from the measurement locations after reacting with the diffraction gratings;
- d) determining the overlay error (or "overlay misalignment" in col. 5, line 7) between the bottom diffraction gratings and the top diffraction gratings using the detected radiation from the measurement locations; and
- e) correcting (via an "alignment" in col. 11, line 21) the overlay error (corresponding to a "measurement resolution" in col. 11, line 30) for effects of local process variations created during processing of the overlay pattern using the detected radiation from at least one pair of the measurement locations from the overlay pattern.

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Regarding claim 34, Raymond discloses the method of Claim 33, wherein at least two of the measurement locations have the same magnitude designed in offset in opposite directions (as discussed above with respect to fig. 15: offset) and at least two measurement locations have the same magnitude designed in offset in the same direction (as indicated in fig. 15: Angle Number that indicates a single angle for both measurement locations).

5. Claims 23-33,35 and 36 are rejected under 35 U.S.C. 102(e) as being anticipated by Mieher et al. (US Patent Application Publication No.: 2004/0169861 A1).

Regarding claim 33, Mieher discloses of a method comprising:

- a) providing an overlay pattern (fig. 2(a)-(f)) having at least four measurement locations (as indicated in fig. 3(a), numerals 302(a)-302(d)), each measurement location having a bottom diffraction grating and a top diffraction grating that overlies the bottom diffraction grating and has a designed in offset from the bottom diffraction grating (all of which is shown in figs. 2(a)-2(f)), at least two pairs of the measurement locations have the same magnitude designed in offset (fig. 2(a) has offset $+F$ and fig. 2(b) has offset $-F$);
- b) illuminating (via fig. 4,num. 402) each of the measurement locations of the overlay pattern with incident radiation that reacts with the diffraction gratings;
- c) detecting (fig. 4,num. 412) the radiation from the measurement locations after reacting with the diffraction gratings;
- d) determining the overlay error (fig. 3(a), num. 308) between the bottom diffraction gratings and the top diffraction gratings using the detected radiation from the measurement locations; and
- e) correcting the overlay error (or "corrections...of the errors" in paragraph [0070], last sentence) for effects of local process variations created during processing of the overlay pattern using the detected radiation from at least one pair of the measurement locations from the overlay pattern.

Regarding claim 35, Mieher discloses the method of Claim 33, wherein a first pair (fig. 3(a), numerals 302a and 302b) of the measurement locations have a first magnitude designed in offset ($+F+f_0$ in num. 302a and $-F+f_0$ in num. 302b) in opposite directions and a second pair (fig. 3(a), numerals 302c and 302d) of the measurement locations have a second magnitude designed in offset in opposite directions ($+F-f_0$ in num. 302c and $-F-f_0$), wherein the first magnitude (said $+F+f_0$) is different (via \pm -sign) than the second magnitude ($+F-f_0$).

Regarding claim 36, Mieher discloses the method of Claim 33, wherein correcting the overlay error for effects of local process variations created during processing of the overlay pattern is performed while determining the overlay error (since the correcting of Mieher is done to during the step of "refine the determination of the overlay E" in [0070], last sentence).

Claim 23 is rejected the same as claim 33. Thus, argument similar to that presented above for claim 33 is equally applicable to claim 23.

Regarding claim 24, claim 24 is rejected the same as claim 23 except for the additional limitation as disclosed in Mieher of further comprising:

a) providing the overlay pattern having the plurality of measurement locations prior to depositing the top diffraction gratings over the bottom diffraction gratings (or "partial...layer" in [0065]), such that the overlay pattern is incomplete and each measurement location of the incomplete overlay pattern has a bottom diffraction grating.

Regarding claim 25, Mieher discloses the method of Claim 24, wherein using the detected radiation from the measurement locations of the incomplete overlay pattern and the detected radiation from the measurement locations of the completed overlay pattern to determine the overlay error comprises:

- a) generating a plurality of ratios (as shown in [0064]) of differential spectra from measurement locations of the incomplete overlay pattern;
- b) generating a plurality of differential spectra (as shown in [0064]) from measurement locations of the completed overlay pattern;
- c) using said plurality of ratios and said plurality of differential spectra to determine the overlay error ("determine overlay" in [0065]).

Regarding claim 26, Mieher discloses the method of Claim 25 wherein using said plurality of ratios and said plurality of differential spectra comprises:

- a) directly solving for the overlay error (via said equation in [0064]) based on said plurality of ratios and said plurality of differential spectra.

Regarding claim 27, Mieher discloses the method of Claim 25, wherein using said plurality of ratios and said plurality of differential spectra comprises:

- a) curve fitting (fig. 3(b): Linear approximation).

Claim 28 is rejected the same as claim 36. Thus, argument similar to that presented above for claim 36 is equally applicable to claim 28.

Claim 29 is rejected the same as claim 33. Thus, argument similar to that presented above for claim 33 is equally applicable to claim 29.

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Claims 30 and 32 are rejected the same as claim 35. Thus, argument similar to that presented above for claim 35 is equally applicable to claims 30 and 32.

Claim 31 is rejected the same as claim 30. Thus, argument similar to that presented above for claim 30 is equally applicable to claim 31.

6. Claims 23 and 24 are rejected under 35 U.S.C. 102(e) as being anticipated by Stirton (US Patent 6,458,605 B1)

Regarding claim 23, Stirton discloses a method comprising:

- a) providing an overlay pattern (fig. 3B, num. 200) having a plurality of measurement locations, each measurement location includes a bottom diffraction grating (fig. 3A,num. 202) and a top diffracting grating (fig. 3A,num. 204) that overlies the bottom diffraction grating and has a designed in offset (as indicated by the stager of numerals 212 and 210) from the bottom diffraction grating;
- b) illuminating (fig. 3B, num. 132) each of the plurality of measurement locations of the overlay pattern with incident radiation that reacts with the diffraction gratings;
- c) detecting (fig. 3B,num. 134) the radiation from the measurement locations after reacting with the diffraction gratings;
- d) determining the overlay error (via fig. 3B,num. 136) between the bottom diffraction gratings and the top diffraction gratings using the detected radiation from the measurement locations from the overlay pattern; and
- e) correcting the overlay error (via an "error correction" in col. 4, line 3) for effects of local process variations created during processing of the overlay pattern using the detected radiation from at least one pair of the measurement locations from the overlay pattern.

Regarding claim 24, claim 24 is rejected the same as claim 23 except for the additional limitation as disclosed in Stirton of further comprising:

a) providing the overlay pattern (as indicated in fig. 3A) having the plurality of measurement locations prior to depositing the top diffraction gratings over the bottom diffraction gratings, such that the overlay pattern is incomplete and each measurement location of the incomplete overlay pattern has a bottom diffraction grating.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Laughery et al. (US Patent 6,780,550 B2) is pertinent as measuring a first grating as shown in fig. 7:400nm, perform further processing to obtain a new grating as shown in fig. 7,num. 401, and obtaining a difference of the gratings in fig. 11,num. 705. This reference is applicable to claims 23 and 24.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Rosario whose telephone number is (571) 272-7397. The examiner can normally be reached on 9-5.

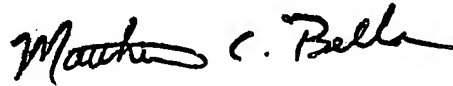
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DR

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